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A NEW TRANSPARENT FILM.

READ BY F. C. BEACH, P.S.A.P.N.Y.,

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WITHIN the last three years numerous efforts have been made to furnish to the photographic world several substitutes for glass as a support for the sensitive film intended to be equally as good, extremely light, and non-breakable.

We have seen paper made translucent with castor oil extensively used; but the messy and troublesome manipulation over-balanced its other desirable qualities. Succeeding this has been introduced the double film, on a paper support, by means of which the negative film can be removed and transferred from the paper to glass or a gelatine skin after development and fixing.

Thus, though the manipulation requires more practical experience than when ordinary paper is used, a flexible film perfectly transparent, free from grain, and equal to glass, is obtained.

It would seem that the additional operation of separating the sensitised film from the paper support and attaching it to a transparent film or skin of tough gelatine might be avoided by coating the gelatine skin itself with the sensitive emulsion. I presume, however, this has been thought of, but rejected on the ground that paper as a support is perhaps more pliable and more easily coated. At any rate, the transfer process seems to me too complicated for the average amateur to easily master, and one which it would not be advisable to employ, unless a long journey in a foreign country is to be undertaken, when it is necessary to carry and have on hand a large supply of material, having the least possible weight. What is wanted is support for the sensitive film, which shall be as light as paper, transparent as glass, resisting the action of water and other acids and alkalies like glass, and capable of retaining its original size and shape throughout the necessary manipulations.

Then, when the negative is developed and fixed, it is precisely as if on glass, transparent, quick printing, and non-breakable; all after transferring operations being unnecessary.

A step in this direction was the Woodbury film, which I exhibited before this Society a little over a year ago. The support employed was a special thin paper treated with a resinous substance to make it transparent, and coated on both sides with gelatine sensitive emulsion. The film was quite delicate when wet, and easily torn. When dry, it presented a peculiar crinkled or wrinkled appearance, which was not altogether satisfactory.

Last fall, a new transparent film based on the invention of Francis H. Froedman, a chemist, of Dublin, Ireland, was introduced, and is now supplied by the Vergara Film Company, of London. This is the film which I wish to exhibit and explain to you to-night, samples of which were kindly sent to me by the Company. The film is patented in England, but not in this country, so far as I have been able to learn; hence, there is no reason why it cannot be made successfully here.

It is perfectly smooth and flat, and looks very much like a thin glass plate. It is not affected by hot or cold water, and is insoluble in dilute acids and alkalies. The patent is dated May 3, 1887.

From the foregoing description, it will be seen that the film is virtually nothing more than an insoluble gelatine skin, rendered nearly colourless by sulphurous acid, coated with a sensitive emulsion.

From a few experiments I have made with the film, I am convinced that it can be treated just as easy and certain as glass, and is much better than paper, because it is quite tough, like leather, and will not tear. I have discovered that very cold weather causes the film to curl some on the emulsion coated side, while in a temperature of 60° or 70° F. it will flatten out nearly straight. I use the film on an ordinary Eastman carrier, which clamps the edges down flat. It may be slid in an ordinary plateholder with a thin plate at the back. But the special carrier is the best.

The sensitiveness of the film is governed by the sensitiveness of the emulsion put on it. In making a test with Warnerke's sensitometer, using a strong potash developer, I find the highest number registered is 17, while a Cramer 40 plate registers 22. Both were developed at the same time in the same developer for five minutes. The highest numbers can be seen by holding the plate or film over a piece of white paper. Cramer's plate is, therefore, ahead on sensitiveness.

The development of an exposed film is very simple, and is carried on precisely like a plate. The film should first be soaked in water not colder than 60° F., for perhaps two minutes, until it lies flat. If the water is very cold the corners and edges will at first curl upward a little. Then the water is drained off and the developer applied. That recommended is the pyro and ammonia developer, but I find the potash developer based on my formula works excellently. On the sample films I have brought, I employed three grains of pyro to the ounce, and six grains of potash. The development proceeds gradually, is under perfect control, and the film in the wet state

can be easily removed and examined by transmitted light. The patented tray exhibited before the Society a short time ago, in which the film could be clamped to form its bottom, would work excellently, since the tray acts as a frame to hold the film.

After development, which usually takes about as long as a plate, the film is removed from the tray by taking hold of one corner and sliding it out on a glass plate; it is then held under the tap and washed for a minute, removed from the plate, and placed picture side upwards in the hypo bath, which should not be too cold (strength, 1 oz. to 4 oz. of water); it fixes out in a few minutes, is then washed for half an hour by soaking in three or four changes of water. Unless the film is completely fixed and well washed it will dry out with a slight yellow tinge. My first experiment in drying the film was to place it, while damp and limp, picture side upwards, on a glass plate; then I set the latter in the drying rack. In the morning the film had fallen off, and was somewhat buckled up. But the rapidity of drying, as recommended by a special process, is one of the excellent points which I will demonstrate at the close of this paper.

Removing the limp and leather-like negative from the wash water, slightly draining off the surplus water, you simply put it in a tray and pour over it an ounce, or less, of common alcohol, and let it soak for fifteen minutes. Before the end of that time you will notice that the film becomes quite rigid. After soaking in alcohol I place the film between two sheets of clean blotting-paper, and bend them around a paper cylinder, such as is used for mailing purposes, not less than three inches in diameter, so that the coated side of the film will be outward, and clamp the paper to the cylinder by two or three elastic bands. If the film is removed from the alcohol before the time specified, it will stick in places to the blotting-paper.

If kept in a draft of warm, dry air from five to fifteen minutes, the film will become perfectly hard and dry, retaining, of course, the curve of the cylinder; but when put in a printing frame under pressure it is made quite flat, and as smooth and even as a glass plate.

The buckled film negative spoken of I treated in this way, wetting it first until it was limp, soaking in alcohol, and then bending it around the cylinder; it dried perfectly flat and smooth. Fresh alcohol should be used for each separate film.

There appears to be no better way to dry the film smooth. I tried squeezing it face downwards on a sheet of vulcanised rubber, but when dry it shrunk and buckled up unevenly, as you will see by the specimen I have brought. If the film is suspended from two corners on a line to drain and dry, it will take an hour or more, but it will curl inward around the edges. This may be overcome somewhat by soaking the film in water containing a small percentage of glycerine previous to drying. It is also a good plan when the film is surface dry to place it between sheets of blotting-paper,

putting the latter in a printing frame; the pressure of the spring will cause the film to dry flat. The film does not frill, and there is no danger of the sensitive film slipping off as it sometimes does on glass plates.

It has been said that the film is adapted for photogravure purposes, because it can be printed from on either side. I estimate it to be about $\frac{1}{64}$ of an inch thick, and find when it is printed from on the wrong side there is a slight blur. Still there is no reason why the film may not be made sufficiently thin to be used from either side. The picture on the film may be as readily intensified or reduced as on glass.

The manifest advantages of this film to the tourist are that it supplies all the good qualities of glass and paper, with none of their drawbacks; being as light as paper, large quantities can be carried in a small space.

I submit for your inspection five $2\frac{3}{4}$ inch square negatives made by contact from transparencies, and a strip of a part of an original negative made on a film not backed with collodion, accompanying all with a silver print. These were sent to me by the Company as specimens. I also have two or three 4 by 5 negatives made by myself, one exposed instantaneously with Hoover shutter, Ross lens, $7\frac{1}{2}$ inch focus, $f/_8$ stop; another time exposure same lens $f/_{40}$, three seconds, very cloudy at time, and an over-exposed negative having the peculiar buckling appearance obtained by drying on rubber. I also have a transparency made by contact from one of these negatives, developed with oxalate of potash and iron; also a sample of the film, a portion of which was dipped in hot water to dissolve off the sensitive film. You will notice the remarkable transparency of the shadows in all.

Thanking you for your attention, I close with the hope that a film equally as good may yet be produced in this country by some of our energetic manufacturers.

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